FOOD HABITS OF THE GROUND SKINK

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As part of a study on the population ecology of the ground skink *Lygosoma laterale,* monthly collections of this lizard were made from August, 1960, to April, 1962, at Gainesville, Florida. This collection was made in order to study the reproductive cycle, parasites, and food habits. The present paper is a report on the food habits of 329 individuals.

Previous studies concerning the food habits of this skink have shown it to be primarily insectivorous. Hamilton and Pollack (1961) examined 154 specimens collected from February to November in Georgia; insects occurred in 83 per cent and spiders in 23 per cent of all food items. Lewis (1951) examined 25 adults and 25 juveniles and also found mostly insect material. Slater (1949) examined 84 adults collected in Louisiana and found insects and spiders to be the most abundant food items. For a summary of the literature prior to 1949 concerning the food habits of *L. laterale,* see Slater's paper.

Procedure

Field trips to collect skinks were made at various times of the month and at various times of the day. Any individual sighted was collected, if possible, and was preserved in 10 per cent formalin within at least three hours of capture. All specimens, regardless of size, were injected with formalin to insure complete preservation of the internal organs. The entire digestive tract, from esophagus to cloaca, was examined under a dissecting microscope. Food items were identified in most cases to the ordinal rank.

The results are tabulated in two ways: 1) the number of individuals with a certain item and the corresponding percentage, and 2) the total number of a certain item and the corresponding percentage. In each table those insects which were unidentifiable to order were included within the group 'Insecta'. The group labeled 'Unidentified' contains items that were digested so that even the class could not be determined.

Adults are considered as those skinks with a snout-vent length of 35 mm or more; juveniles as those with a snout-vent length of 34 mm or below.

General Food Habits

Only two of the 329 individuals examined were completely empty of food material. A list of the food items is given in Table 1. The major prey of the ground skink consisted of the common orders of insects, spiders, and isopods. The average number of items per lizard was 5.7. Comments concerning certain groups of food items are given below.

TABLE 1

Gut Contents of 327 *Lygosoma laterale*. The total number of items was 1825.

Item	Per Cent with Item	Per Cent of all Items	Item	Per Cent with Item	Per Cent of all Items
Insecta	91	71	Araneae	48	14
Coleoptera	23	6	Isopoda	19	8
Diptera	20	21	Pulmonata	10	2
Orthoptera	10	2	Diplopoda	3	1
Hemiptera	22	6	Opisthopora	2	*
Collembola	17	6	Chilopoda	1	*
Lepidoptera	19	4	Acarina	1	*
Hymenoptera	13	8			
Isoptera	2	2	Vegetation	1	*
Neuroptera	1	*	Unidentified	24	4
Dermaptera	*	*	Shed skin	1	*

* Less than 0.05 per cent.

Coleoptera: Larvae comprised 28 per cent of the coleopterous material. Very few lizards contained more than one beetle, although the maximum number in any one skink was eight.

Diptera: One large, adult female contained 223 adult fruit flies, plus several other food items.

Isoptera: Two lizards, an adult female and an adult male, each contained 33 winged termites.

Lepidoptera: Only four per cent of all lepidopterans eaten were adults. One juvenile lizard, 24 mm in snout-vent length, contained a 16 mm long larva, and another juvenile also 24 mm in snout-vent length contained a larva 13 mm long.

Neuroptera: Both occurrences of neuropterans were larvae.

Araneae: All of the spiders taken were what are commonly called ground spiders. A juvenile female skink contained nine species of spiders, plus two isopods, two species of coleopterans, and five hemipterans of four different species.

Isopoda: A juvenile male contained 33 isopods, plus four other items.

Diplopoda: All of the millipedes eaten belonged to the family Polydesmidae.

Acarina: Both occurrences of acarinids were hard ticks.

In feeding, a ground skink is first attracted by motion of the food item. Motion is probably a prerequisite for initiating the feeding response since no pupal cases of any insect were eaten, and all the non-insect food is capable of movement. Some doubt might exist concerning the snails but the movement of the head portion has been observed to be sufficient to elicit attention from a hungry skink. Once the item is seized, the lizard violently shakes it against objects on the ground and then swallows it. The lizard's tail slowly twitches from side to side during the entire sequence.

Size Variation

The food habits of adults as compared with those of juveniles are given in Table 2. There appear at first to be only slight differences between the two size groups as regards major food items. The mean number of items per skink is similar; 5.5 for adults, and 5.8 ($S.E._m = 0.51$) for juveniles. However, when the 223 fruit flies in an adult female are subtracted from the total number of items and a new mean computed for adults the difference is greater (4.5 for adults, $S.E._m = 0.29$). The results of a t test comparing these means, 5.8 and 4.5, indicates a significant difference ($t = 2.27$, $P. > .05$). Also, in 11 of the 14 highest groups, ranked by percentage of guts with item, juveniles had a higher percentage than adults. These results indicate that juveniles eat more items than do adults. Since no measurements were made concerning weight or volume of the food items no conclusions can be made as to which group consumes the most biomass. Since young animals tend to have a higher metabolic rate than older and larger animals, it is possible that juveniles also eat more per size unit than do adults.

TABLE 2

Gut contents of *Lygosoma laterale* listed by age and sex

Item	Adults (234)		Juveniles (93)		Adult Male (128)		Adult Female (106)	
	Per Cent with Item	Per Cent of Item	Per Cent with Item	Per Cent of Item	Per Cent with Item	Per Cent of Item	Per Cent with Item	Per Cent of Item
Insecta	89	75	94	61	91	71	87	78
Coleoptera	21	6	30	8	20	7	22	5
Diptera	17	25	27	5	14	6	20	40
Orthoptera	11	2	7	1	12	4	10	2
Hemiptera	19	6	29	8	20	7	17	5
Collembola	10	4	33	12	9	4	10	4
Lepidoptera	19	4	17	3	19	6	20	3
Hymenoptera	14	10	12	5	16	16	10	5
Isoptera	3	6	1	**	2	6	4	6
Neuroptera	**	**	1	**	0	0	1	**
Dermaptera	**	**	0	0	0	0	1	**
Araneae	46	12	54	18	45	15	47	9
Isopoda	19	7	19	11	16	7	23	6
Pulmonata	9	2	12	2	6	2	12	2
Diplopoda	2	**	5	1	3	1	0	0
Opisthopora	1	**	3	1	1	**	2	**
Chilopoda	1	**	0	0	0	0	2	**
Acarina	**	**	1	**	1	**	0	0
Vegetation	1	**	1	**	1	**	1	**
Unidentified	20	4	32	6	17	4	24	3
Shed skin	1	**	0	0	0	0	2	**
Number of items	1282		543		549		733	
Mean no. items	5.5		5.8		4.3		6.9	

** Less than 0.05 per cent.

Sexual Variation

The food habits of male and female adults are given in Table 2. There appears to be very little difference between sexes as regards per cent with item. The mean number of items per skink for males is 4.3 ($S.E._m = 0.35$), that for females is 6.9. But here again the one female containing 223 fruit flies should receive special attention. The mean number of items per female, excluding this particular one, is 4.8 ($S.E._m = 0.47$). A t test comparing these means, 4.3 and 4.8, gives a non-significant value ($t = 1.20$, P. $< .05$).

Seasonal Variation

The food habits by season and the mean number of items per skink per season are given in Table 3. The mean number of items per skink for September through November, excluding the female with 223 dipterans, is 4.4. The insects as a whole are very constant in both percentages for all four seasons, whereas the per cent of skinks with spiders and isopods changes with the seasons. These results are probably due to population changes within these particular food groups or changes in environmental factors which affect the activity cycle of the food item.

Discussion

The type of food eaten by the ground skink is of course restricted by the habitat and size of the skink. Yet with these restrictions the results do not indicate a preference for any one type of food. Food items within a certain size range are probably taken according to their availability.

Food habit studies are of considerable interest, not only for answering the question as to what the animal eats, but also for supplying data for studies on population energetics. To get an estimate of the gross amount of energy taken in by a population it is necessary to know the type and amount of food eaten, and the caloric values of these food items. The results of a recent study by Slobodkin and Richman (1961) indicate that for several animal species the caloric values per gm lie within a relatively narrow range. Thus in order to obtain a crude estimate of the gross energy taken in by a population it would be necessary to know only the total amount of food eaten per unit time.

TABLE 3

Gut contents of *Lygosoma laterale* listed by season

Item	Dec-Jan-Feb (95)		Mar-Apr-May (68)		Jun-Jul-Aug (93)		Sep-Oct-Nov (71)	
	Per Cent with Item	Per Cent all Items	Per Cent with Item	Per Cent all Items	Per Cent with Item	Per Cent all Items	Per Cent with Item	Per Cent all Items
Insecta	89	68	90	74	92	66	89	78
Coleoptera	21	8	16	6	30	9	20	4
Diptera	17	4	21	14	17	14	25	48
Orthoptera	5	1	10	2	14	4	11	1
Hemiptera	24	9	21	6	16	5	27	5
Collembola	14	5	9	3	22	8	21	7
Lepidoptera	19	4	12	3	18	5	24	3
Hymenoptera	21	22	18	6	10	2	3	*
Isoptera	1	*	6	21	2	1	0	0
Neuroptera	1	*	0	0	1	*	0	0
Dermaptera	0	0	0	0	0	0	1	*
Araneae	47	17	63	16	51	16	31	6
Isopoda	26	8	9	2	5	9	37	10
Pulmonata	7	1	10	2	14	3	8	1
Diplopoda	2	*	0	0	5	1	3	*
Opisthopora	0	0	0	0	3	1	4	1
Chilopoda	1	*	0	0	0	0	1	*
Acarina	0	0	1	*	0	0	1	*
Vegetation	1	*	0	0	0	0	3	*
Unidentified	28	5	25	5	23	4	23	3
Shed skin	1	*	0	0	0	0	1	*
Number of items	500		330		459		536	
Mean no. items	5.3		4.9		4.9		7.5	

* Less than 0.05 per cent.

Summary

A total of 329 specimens of *Lygosoma laterale* were examined for food habits. Only two lacked food material.

The major food items in rank of importance were insects, spiders, and isopods.

The mean number of food items per individual for juveniles was significantly higher than that for adults.

No major difference in food habits was found between male and female adults.

Insects, but not spiders and isopods, occurred as food items in approximately the same frequency throughout the year.

Literature Cited

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